

Dynamic Technical Consultants, Inc.

**3200 Glen Royal Road - Suite 102
Raleigh, NC 27617**

PREPARED FOR:
Young, Clement & Rivers
Post Office Box 993
Charleston, SC 29402-0993
Attention: Duke Highfield

Limehouse & Sons, Inc v Manitowoc & Grove Worldwide, LLC
2:06-CV-1754
Date of Loss: 6.12.2004

prepared by:

David C. McCandless, M.S.M.E., P.E.

DYNAMIC TECHNICAL CONSULTANTS, INC
3200-102 Glen Royal Road
Raleigh, NC 27617

November 26, 2007

EXHIBIT A



I. Introduction

At the request of Duke Highfield of Young, Clement & Rivers, personnel of Dynamic Technical Consultants, Inc. [DTC] have conducted an investigation regarding a fire that occurred on June 12, 2004 involving a Grove GMK series crane owned and operated by Limehouse & Sons, Inc. This report represents the current findings and conclusions of the continuing investigation.

II. Scope

As of this writing, the DTC investigation has included the following:

- ▶ Examination and documentation of the incident vehicle
- ▶ Initial examination and removal of hydraulic system components from the subject vehicle
- ▶ Review of the deposition testimony of Earl Droze and James Limehouse
- ▶ Discussions with Mr. Droze regarding his observations of the fire
- ▶ Review of hydraulic schematics of the subject machine [copies were not retained by DTC, Inc personnel]
- ▶ Review of the following documents: Amended Complaint; Answer to Amended Complaint; Amended Consent; Amended Scheduling Order; Plaintiff's responses to first set of interrogatories and requests for production; documents produced by Manitowoc bates stamped 1-50; records produced by Limehouse bates stamped 1-51; documents produced by Fireman's Fund bates stamped FFIC 1-640; documents produced by IMR bates stamped IMR 1-45; and documents produced by Carolina



Precision bates stamped 1-80.

- ▶ Review of the written report of Bill Johnson of Core Engineering
- ▶ Review of the written report of Paul Eason of E4 Consulting

III. Qualifications

See attached listings

IV. Compensation

David C McCandless, MSME, PE	\$170/hr
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V. Prior Testimony

See attached listings

VI. Discussion

The subject machine was examined and documented on July 7, 2004 and on July 12, 2004 at Southeastern Crane in Ladson, SC. During the July 7, 2004 examination representatives of Limehouse & Sons were present. This initial examination was non-destructive and did not involve the movement or alteration of the physical evidence. The July 12, 2004 examination was conducted in conjunction with representatives of Limehouse & Sons [James Limehouse], Southeastern Crane [Ray Spires], Manitowoc Crane [Ray Pope] and Core Engineering [Bill Johnson].

The incident vehicle was identified as follows:

VIN: W09160580XWG12224



Model: GMK 5160 - 1999

The crane was a five axle chassis outfitted with a 175 ton crane assembly. The chassis powerplant was a Cummins 525 turbo charged diesel engine. The engine was physically located both beneath and to the rear of the operator's cab. The chassis DC electrical system was powered via batteries located on the left [driver's] side of the unit. The cooling assemblies, which included heat exchangers for engine air and coolant were located to the rear of the cab on the passenger side of the unit. The intake air filter systems were located to the rear of the cab on the driver's side of the vehicle. The engine exhaust exited the engine block on the right [passenger] side of the vehicle, was routed from right-to-left at the rear of the engine, and exited via an exhaust stack on the left [driver] side of the vehicle. The hydraulic reservoir was located approximately 48 inches rear of the cab near the center of the chassis, slightly offset towards the left side.

Overall examination of the vehicle revealed fire damage primarily near the rear of the cab within the areas immediately surrounding the engine. Fire damage was notably more severe on the right [passenger] side of the engine as compared to the left side. Fire damage was confined to the primary vehicle chassis and did not appear to involve any components of the 175 Ton crane lifting apparatus.

Systematic examination of the vehicle and its systems indicated that the origin area of the fire was inclusive of much of the engine compartment, as well as areas near the rear of the engine behind the cab. Electrical items within the origin area of the fire were examined for defects or deficiencies that pre-existed the fire. Examination of the vehicle electrical systems revealed damage consistent with fire exposure, and not fire causation.



Examination of the hydraulic systems at the rear of the engine revealed a hose failure having occurred at a hydraulic manifold schematically labeled in Grove documents as '8Y1'.

The failed hose connection was used to supply the hydraulic cooling fan motors. The remainder of the hoses on the '8Y1' manifold were visually intact and connected to the appropriate circuits on the vehicle. The circuit containing the failed connection would have been pressurized under normal vehicle operation.

The vehicle operator [Earl Droze] indicated the following sequence of events:

- ▶ He had completed a job in Columbia, SC and was returning to the Charleston area
- ▶ He had not recently experienced any notable problems with the crane
- ▶ He initially heard 'something', that he described as a 'whoosh' sound
- ▶ Shortly there after he noticed heat and flames above the cab
- ▶ He exited the cab with the engine still running.
- ▶ He climbed onto the rear deck, noted fire 'everywhere' at the rear of the cab and tried to extinguish the fire using portable fire extinguishers.
- ▶ The engine shut off as he was on the rear deck
- ▶ He was not able to completely extinguish the fire with the portable fire extinguishers

Based upon examination and documentation of the vehicle and the review of information and documents regarding the subject loss, the origin area of the fire included the engine compartment of the vehicle chassis as well as the area to the rear of the engine behind the operator's cab. The fire occurred due to the separation of the hydraulic hose assembly used to power the cooling fans at the rear of the cab, which released pressurized



Page 5
Limehouse v. Grove

hydraulic fluid into the engine compartment. This fluid subsequently ignited on an elevated temperature surface within the engine compartment.

As of this writing, DTC, Inc. personnel have not participated in a laboratory examination or destructive analysis of the failed hydraulic connection. It is the understanding that no destructive analysis, beyond that mentioned in the E4 report, has been conducted. The data reviewed by DTC, Inc. in this case, which includes the entire data set of both the E4 and Core Engineering reports, does not indicate the crimp specifications of the subject fitting. Without specific data regarding the design specifications of the crimp, specific conclusions regarding the causation of the hose failure are not accurate nor reliable.



Page 6
Limehouse v Grove

Conclusions:

Conclusions are based upon the analysis and information obtained and developed throughout the investigation and represent the currents opinions of Dynamic Technical Consultants, Inc.

1. The origin area of the fire included the right side of the engine compartment as well as the area above the engine at the rear of the cab.
2. The '8Y1' hydraulic manifold was located at the rear of the cab near the hydraulic reservoir. The hose connection that supplied the cooling fans separated at the manifold, allowing a release of pressurized hydraulic fluid into the engine compartment area, which subsequently ignited.
3. Specific analysis of the separated connection will require knowledge of the crimp specifications and geometry for the subject components. Without information regarding the crimp specifications and construction, detailed opinions regarding the cause of the separation are not accurate nor reliable.

Respectfully submitted,

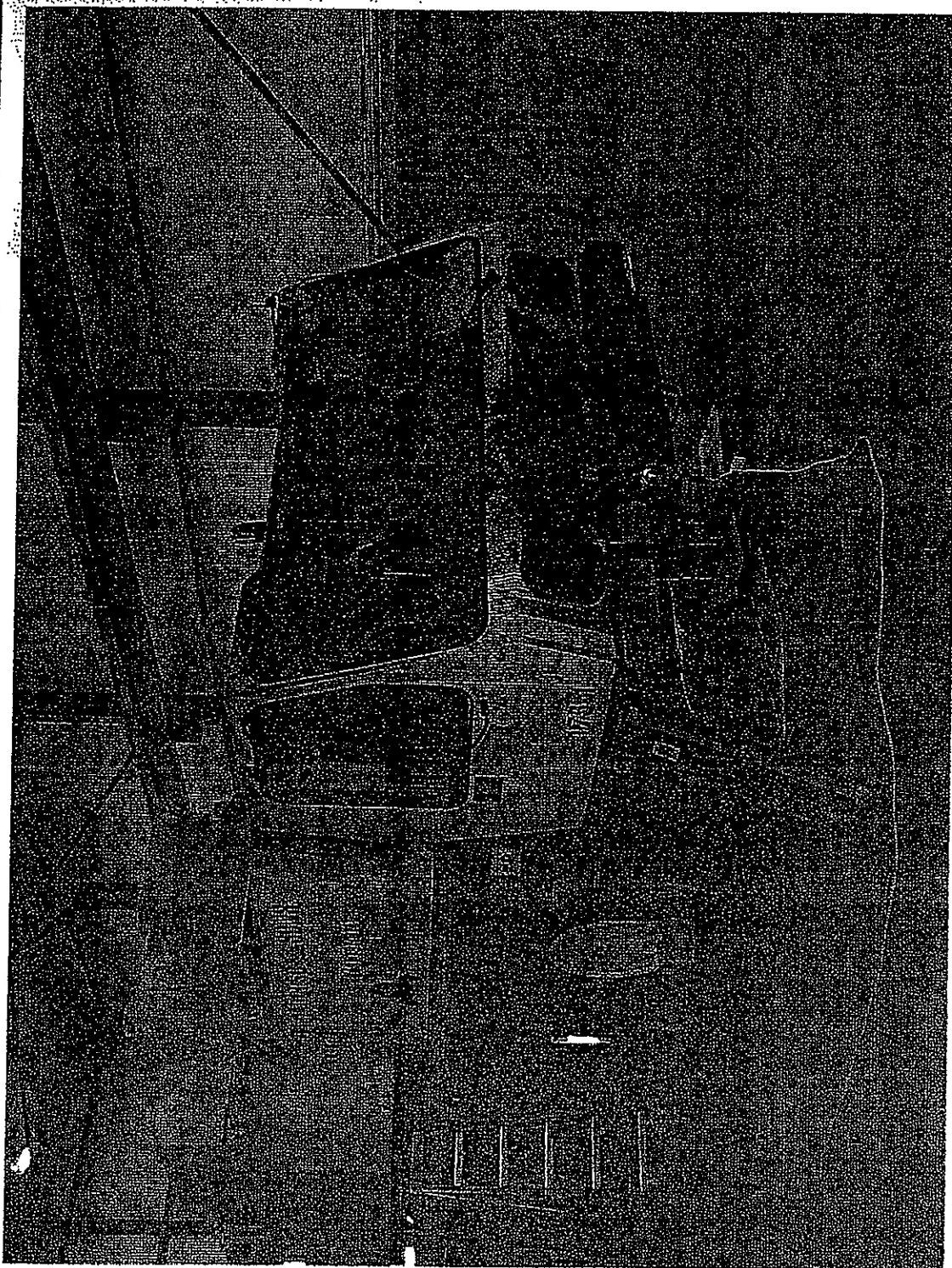
Dynamic Technical Consultants, Inc.

A handwritten signature in black ink, appearing to read "David C. McCandless".

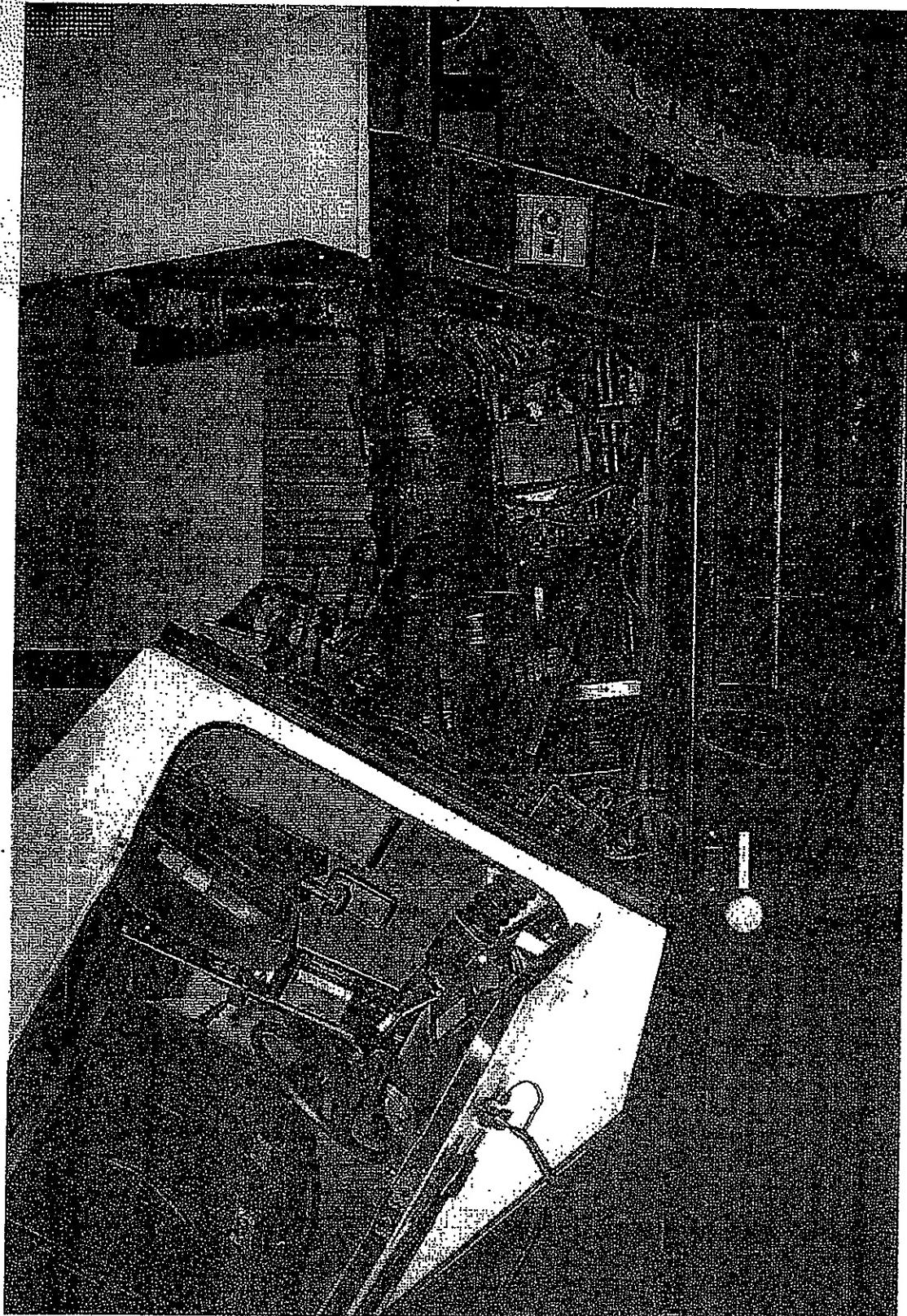


David C. McCandless, M.S.M.E., P.E.

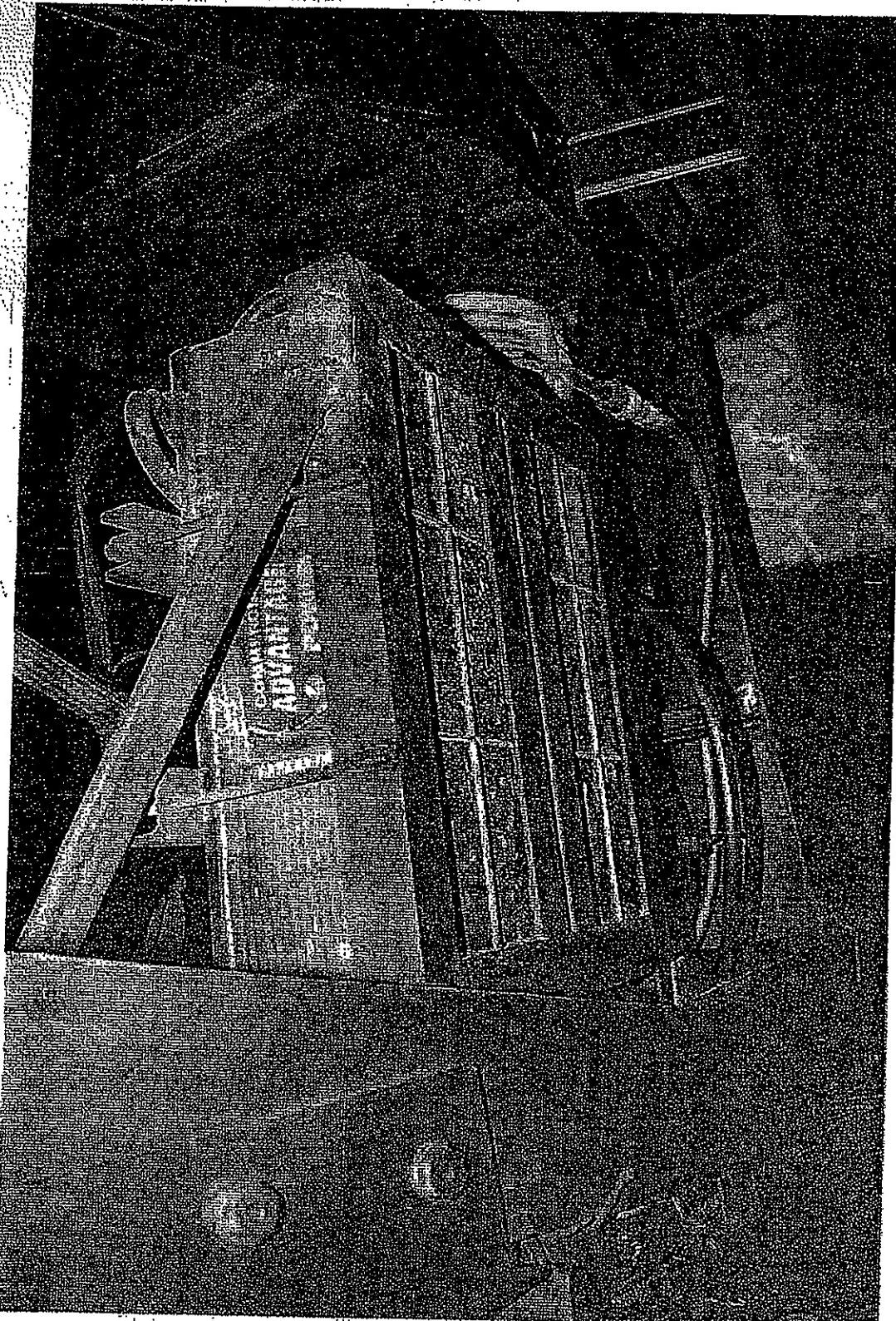
Photographs Limhouse v.
et al
Groves



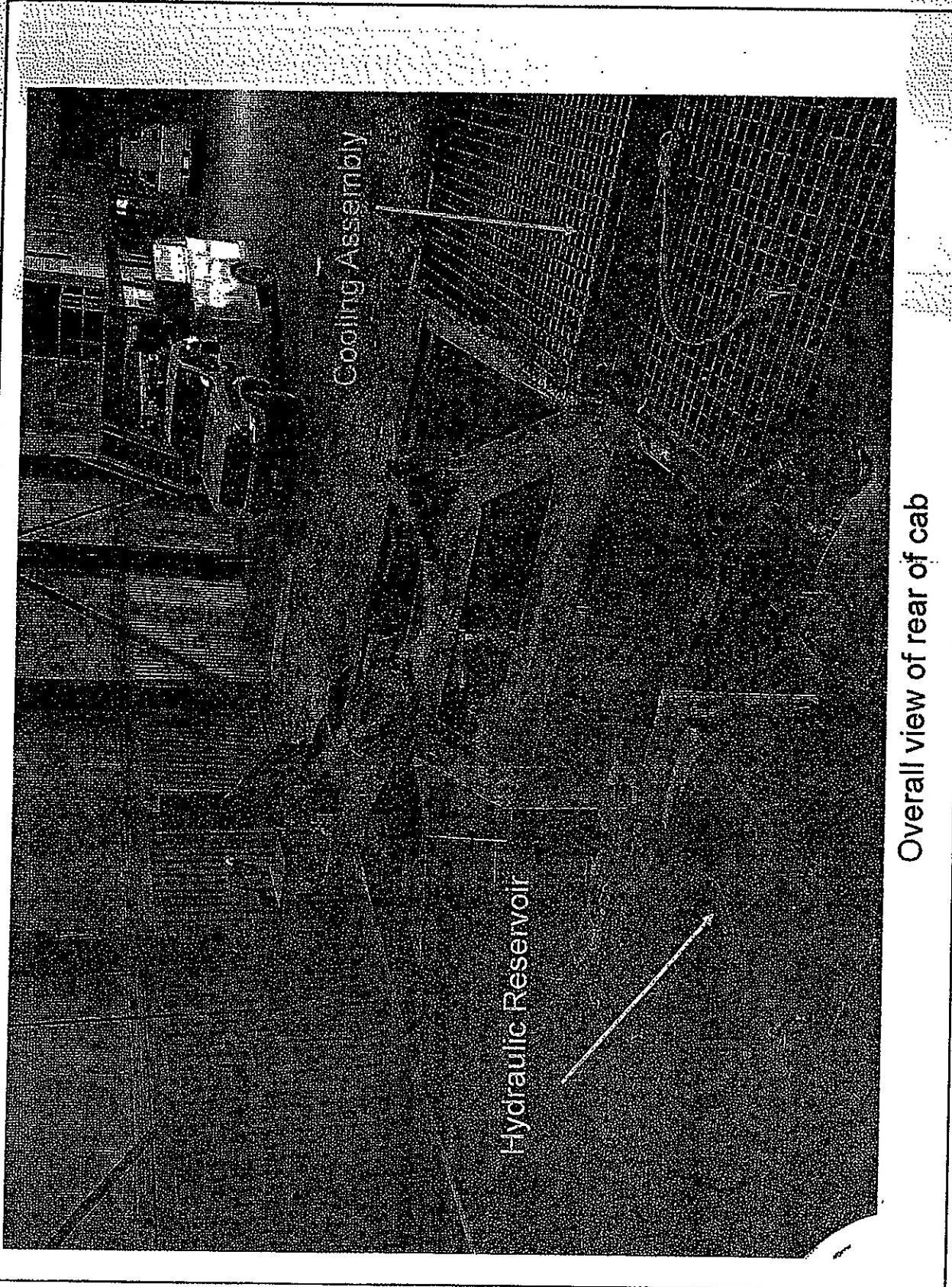
Overall view of subject crane



Overall view of left side of engine

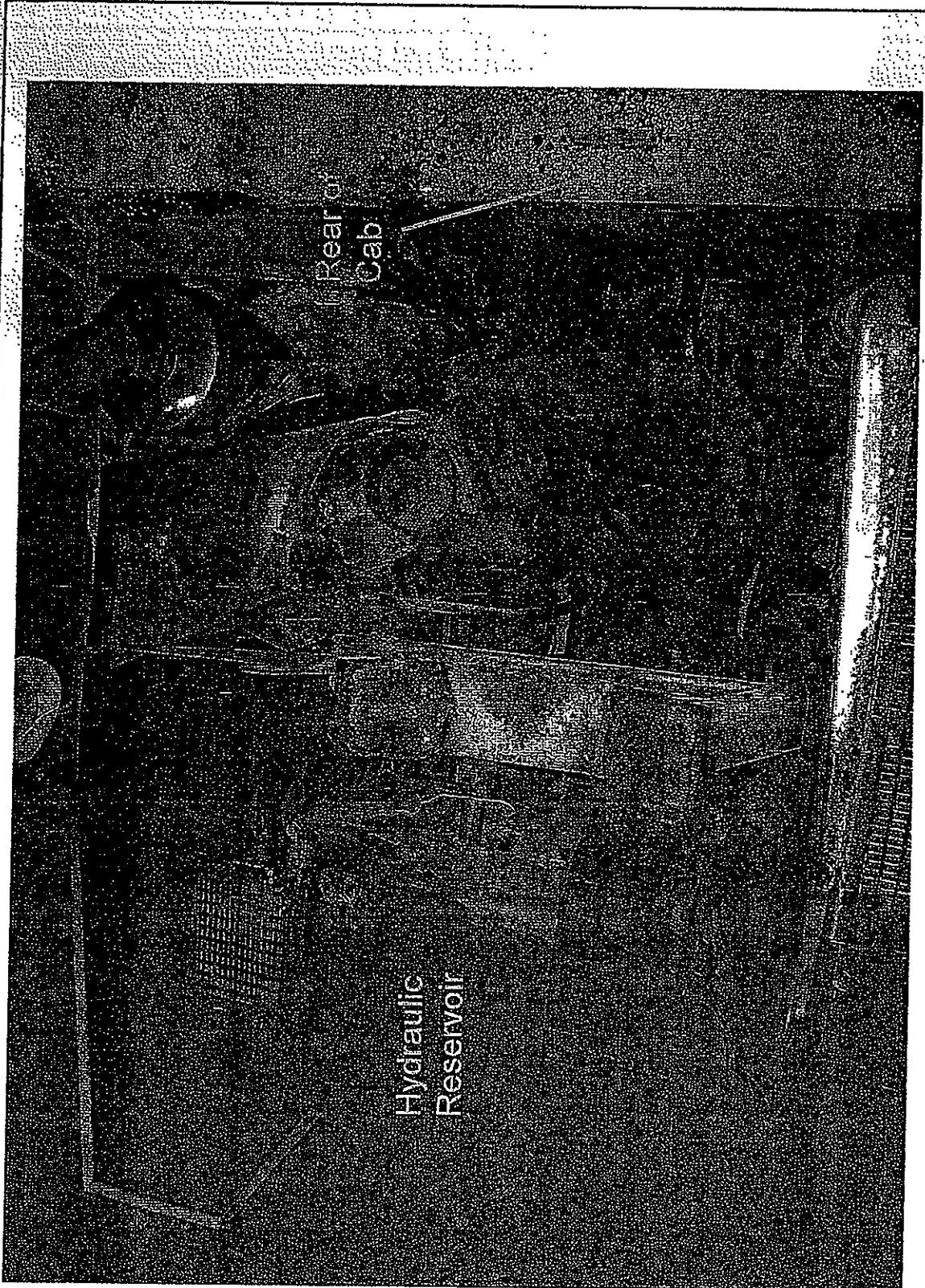


Chassis batteries





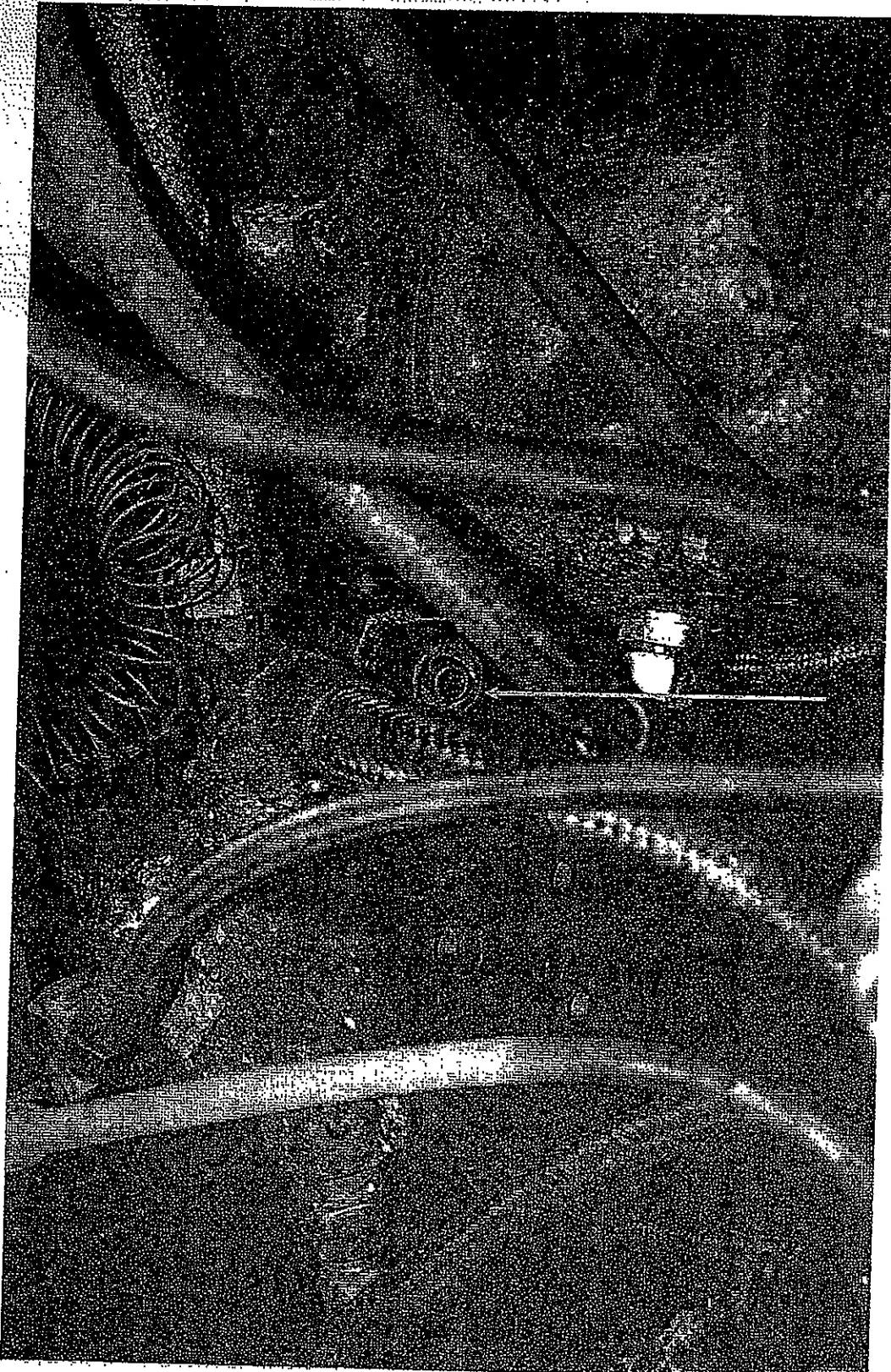
View at rear of cab; Hydraulic reservoir is on the left; Cooling assembly is on the right



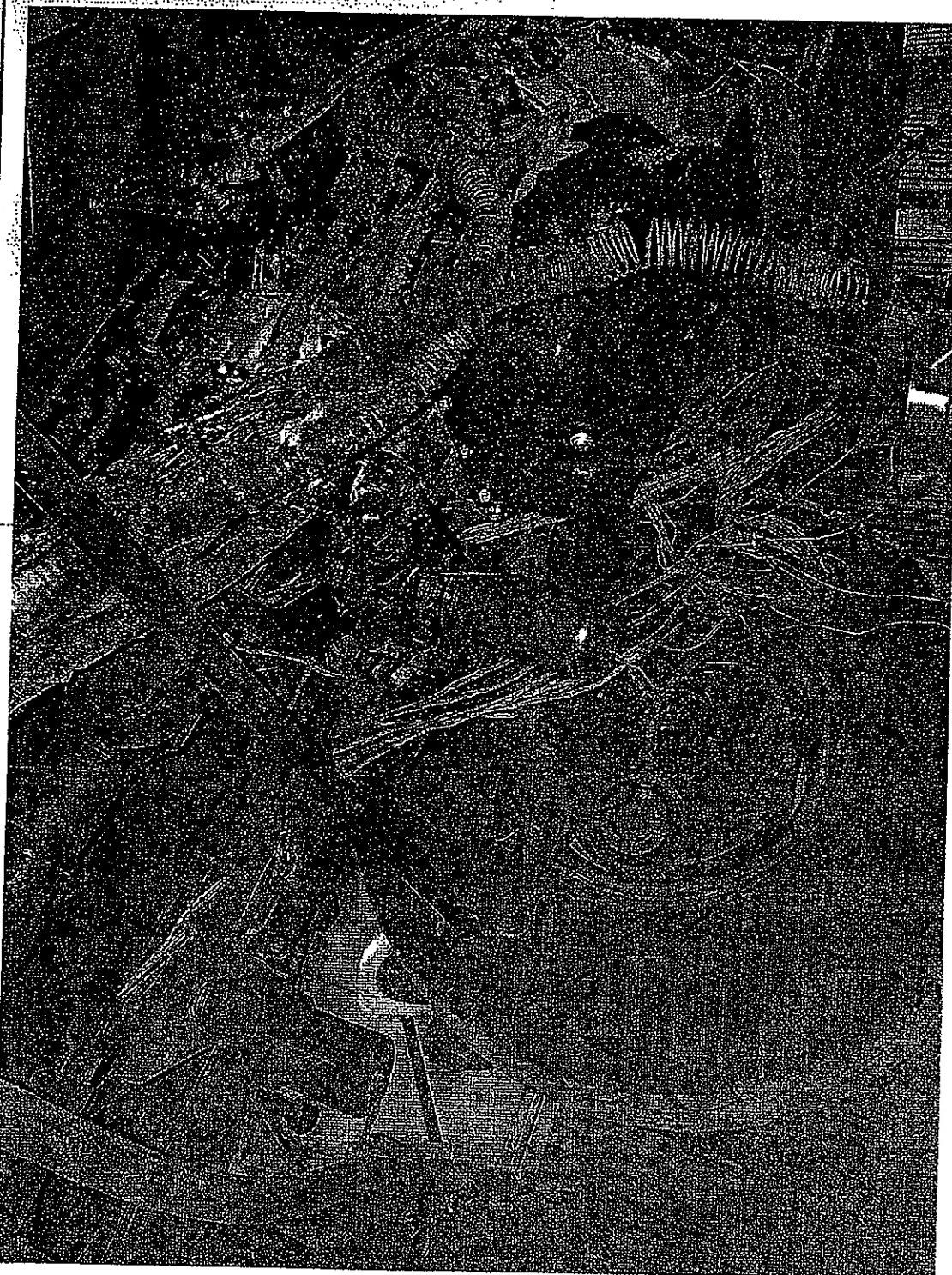
Overhead view at rear of cap



Overhead view at rear of cab



View of separated fitting



Underside of cab/engine compartment



Views of separated hose connection



View of separated connector



Dynamic Technical Consultants, Inc.

*3200 Glen Royal Road - Suite 102
Raleigh, NC 27617*

(919) 785 9775

IRS#: 20-4080484

Fee Schedule - 3.1.2006

Expenses

Mileage:	0.45/mi
Photo CD	25.00
DVD/VHS	15.00
Color Copies	1.00/page
35mm Prints	0.75/ea
Travel [hotel, etc]:	Billed at cost
Report	40.00
Evidence Storage	Variable

Professional Services

David C. McCandless, M.S.M.E., P.E.

\$160/hr

David C. McCandless, M.S.M.E., P.E. - minimum deposition fee

\$500.00

Engineering Technician

\$100.00/hr

Staff Assistant

\$70.00/hr

DAVID CECIL McCANDLESS, M.S.M.E., P.E.

Dynamic Technical Consultants, Inc.
3200-102 Glen Royal Road
Raleigh, NC 27617
(919) 785-9775

EDUCATION

North Carolina State University Raleigh, NC
Bachelor of Science: Degree in Mechanical Engineering
May 1993
Magna Cum Laude

North Carolina State University Raleigh, NC
Master of Science: Degree in Mechanical Engineering,
Interdisciplinary Minor in Mathematics and Materials Science
May 1997

EXPERIENCE

Dynamic Technical Consultants, Incorporated Raleigh, NC
Principal Engineer: March 2006 to present

Perform technical and engineering analyses regarding product failures, industrial accidents, fire origin and cause investigations, and motor vehicle collisions; Prepare written reports regarding findings and conclusions; provide deposition and trial testimony;

Accident Reconstruction Analysis, Inc. Raleigh, NC
Staff Engineer: January 1994 to February 2006

Conduct investigations and prepare reports regarding the engineering analysis and technical failure analysis of mechanical and electro-mechanical components;

Perform motor vehicle accident reconstruction investigations

Investigational scope includes:

- Product/component failures
- Industrial accidents
- Fatigue/mechanical testing of components
- Heavy vehicle accident reconstruction
- Headlamp filament analysis
- Fire investigations (cause and origin)
- Stress analysis of mechanical components
- Testing of products for standard compliance

Qualified in court as an expert in engineering and accident reconstruction

Accident Reconstruction Analysis, Inc. Raleigh, NC
Assistant Engineer: May 1991 to January 1994

Assist in investigation and reconstruction of accidents; Design and fabricate test fixtures for experimental analysis; Prepare cases and exhibits for Federal, State and Local court trials.

Page 2

SOCIETIES AND HONORS

ASME - American Society of Mechanical Engineers
SAE - Society of Automotive Engineers; Membership on the following technical committees:
Accident Reconstruction Readers Committee; Brakes; Human Factors; Occupant Protection; Passenger Vehicle Maintenance; SAE Reviewer Pool; Safety; Tires; Member of the Tire and Wheel Review Board
NAPARS - National Association of Professional Accident Reconstruction Specialists
NAFI - National Association of Fire Investigators
NFPA - National Fire Protection Association

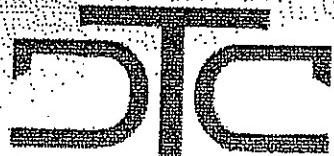
Tau Beta Pi Honor Society

CERTIFICATION

Professional Engineer - NC 23518, VA , SC 22727
Certified Fire and Explosion Investigator [CFEI]

Deposition List - David C. McCandless, M.S.M.E., P.E.

Page 1



Date	Case Name	Venue	Caption
Mar-00	Zarek v Stine, Carts & Parts, Inc.	Cumberland Co, NC	99 CVS 48478
May-00	Heister v Apex Homes	Wake Co, NC	97 CVS 09923
Jun-00	Mary Cherry v Satterthwaite & Land O Sun Dairies	Washington Co, NC	98 CVS 231
Jan-01	Griffin and Bledsoe v Simplicity Service & Controls, Inc., John and Eddie Griffin	Cumberland Co, NC	00 CVS 245
Mar-01	Estate of Wainwright v Donna Hodges	Pitt Co, NC	00 CVS 3549
Aug-01	Estate of Robert Varner v Overland Transport, et. Al	City of Roanoke, VA	770 CL 00000448-00
Aug-01	Gardner Investments Corp v Joe Hawkins Electrical Service	Carteret Co, NC	99 CVS 1053
Nov-01	Brooks v Jugger	New Hanover Co, NC	99 CVS 4777
Mar-02	William Creech v Textron & Foxfire Country Club	Moore County, NC	00 CVS 1190
Sep-02	Dylan White v Cosco and Dorel Industries	Burke County, NC	
Sep-02	Edgar Ray Parris v Elton Howard Mitchell and Mike's Paint & Body	Wilson County, NC	01 CVS 1377
Oct-02	Estate of Veronica Stephenson v Beck and Thomas Simpson Construction Company	Carteret Co, NC	02 CVS 212
Oct-02	Thomas and Lou Ann Payne v Bluegrass Raceway Park and National Hot Rod Association	Bath County, KY	01 CI 90108
Nov-02	Aurelia Mondragon v Willie Williams, Penske Truck Leasing and Ancieto De La Sancha	Davidson Co, NC	01 CVS 3666
Dec-02	Mayflower Seafood Restaurant v Whaley Food Service Repair, Inc	Rockingham Co, NC	01 CVS 1952
Jan-03	Gregory Purdy v Acuity Lighting Group	United States District Court, EDNC	4:02-CV-103-H4
Jan-03	Frank Kirschbaum v Cynthia Brown	Wake County, NC	01 CVS 012537
Mar-03	Kendale Partners v American Power Conversion Corporation	United States District Court, EDNC	1:01CV863
Mar-03	Mozingo v Tands, Inc d/b/a Bojangles Estates of Heather & Brandy Tomlin v BRS Enterprises	Lenoir County, NC	00 CVS 1719
Jun-03	Eddie James v JLG and American Equipment Company	Burke County, NC	02 CVS 1421
Jul-03	Pillowtex Corporation v ACME Electric	Richland County, SC	01 CP 40 0519
		Oconee Co, SC	01 CP 37 141

Deposition List - David C. McCandless, M.S.M.E., P.E.

Page 2

Date	Case Name	Venue	Caption
Aug-03	Kimberly Seeley v Jason Turner and Jennifer Williams	Wayne Co, NC	02 CVS 1054
Aug-03	Kevin and Rebecca Reid v Maytag Corporation and Lynch Appliance Center	Greenville Co, SC	02 CP 23 0007
Nov-03	Willie Lee McDonald v Grace Dalrymple and Rebecca Page King	Bladen Co, NC	02 CVS 357
Feb-04	James and Karen Keithline as Guardians of Heather Keithline v Brent Moore and Clintas Croporation	United States District Court - 14th District, Oklahoma	CJ 2002 6832
Mar-04	Warren Technology v Carrier Corporation	United States District Court - 11th District FL	01-28156 CA21
Apr-04	Wayne and Brenda Harold v Cubic Engineering	Wilkes Co, NC	03 CVS 877
Aug-04	CW Brown Logging v Barko Hydraulics	Brunswick Co, VA	CL0079-00
Dec-04	Linwood Edmondson v Macclesfield LP Gas; Empire Comfort and Tharrington Industries	Edgecombe Co, NC	04 CVS 269
Jan-05	Donald and Dinah Nelson v Sharpe Home Concepts, Waters Plumbing and ARS	Durham Co, NC	02 CVS 4663
Jan-05	Brad and Avery Kauffman v James and Ann Kauffman	Aiken Co, SC	03 CP 02 1020
Feb-05	William and Patty Declue v Maytag	USDC - Eastern Missouri	4:03CV0137 HEA
Mar-05	Penn National v Maytag		
Jun-05	Estate of Kevin Stowe v Stock Building Supply	Wake Co, NC	04 CVS 12990
Aug-05	Joe Tom Ellis v Draper Mitchell and Acree Trucking	Northampton Co, NC	04 CVS 028
Sep-05	Salvador Cuin v USA, Walter Clark Janitorial Services	United States District Court, Middle District NC	1:04CV00627
Sep-05	Arica Stoddard Nixon v Thomas Brothers Ham Company and Richard McDaniel	Greenville Co, SC	2004 CP 23 2813
Dec-05	Simoni v ASI	USDC Eastern PA	04 CV 923
Jan-06	Shelton v LS&K and Burger King		
3/15/2006	Taylor v Daniels	USDC - Eastern District of NC	5:04-CV-404-FL(1)
Apr-06	Noyala v Hytrol	Guilford County, NC	01 CVS 6366
Apr-06	Page v MCLaurin	Scotland Co NC	05 CVS 353
May-06	Stover v Ebtech	Mecklenburg Co NC	05 CVS 2549
Jul-06	Ward v Worrell & Allen Canning	Cumberland Co, NC	05 CVS 8305
8/24/2006	Tony King v SKR Enterprises	Guilford County, NC	03 CVS 1174
10/4/2006	Evans v Southern Wake Electric	Wake County, NC	05 CVS 8292
10/4/2006	Charles Smith v Textron	Scotland Co, NC	05 CVS 304
10/12/2006	Tessler v NCDOT	NC Industrial Commission	AG - 04-0417B
11/21/2006	Padden v Home Depot	Wake County, NC	04-CVS-015292

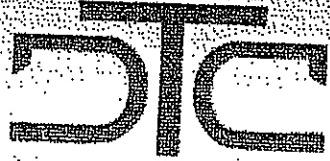
Deposition List - David C. McCandless, M.S.M.E., P.E.

Page 3

Date	Case Name	Venue	Caption
11/29/2006	Harrell v Sagebrush of NC	Duplin County, NC	03 CVS 311
12/1/2006	Sheperd v Assured Flow		
2/9/2007	Dunnagan v HDR Engineering/Mulkey, Inc	Mecklenburg Co NC	04 CVS 22564
2/20/2007	Tinnin v Maytag	City of St Louis	#052-01036
3/27/2007	McLeod v E&H Mowing	USDC - SC - Columbia Division	3:06-CV-00973-JFA
3/2/2007	Watson v Darnell Trucking	USDC - SC - Florence Division	4:06-CV-001147-TLW
4/18/2007	Swift v Guthrie	Buncombe County, NC	05 CVS 3952
4/25/2007	Tew v Country Club Lanes	Alamance County, NC	06 CVS 1177
Jun-07	Wilson v DATA, Morgan & MV Transportation	Durham Co, NC	06 CVS 5132
10/30/2007	Pipkin v Beamon	Wilson County, NC	06 CVS 2131

Trial List - David C. McCandless, MSME PE

Page 1



Trial List - David C. McCandless, M.S.M.E., P.E.

Page 2